

REMARKS

Applicants request favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 31-59 are presented for consideration in lieu of claims 1-30, which have been canceled without prejudice or disclaimer. Claims 31, 52-54 and 57-59 are independent. Support for these claims can be found in the original application, as filed. Therefore, no new matter has been added.

Applicants request favorable reconsideration and withdrawal of the rejections set forth in the above-noted Office Action.

Cancelled Claim 24 was rejected under 35 U.S.C. § 102 as being anticipated by Japanese Patent Document No. 5-217837 to Nishida et al. Cancelled Claims 1-23, 25 and 26 were rejected under 35 U.S.C. § 103 as being unpatentable over the Nishida et al. document. Cancelled Claims 27-30 were rejected under 35 U.S.C. § 103 as being unpatentable over the Nishida et al. document in view of U.S. Patent No. 5,243,377 to Umatabe. With regard to newly added Claims 31-59, the rejections in view of Nishida et al. and Umatabe are respectfully traversed.

The features of newly added claims 31 through 59 relating to the arrangement of the optical units, the reflecting units and the detecting units are shown at least in Figs. 1 and 2 of the drawings and are disclosed in the portions of the specification corresponding thereto.

Newly added independent Claim 31 is directed to a stage apparatus in which a stage is movable along at least two axes. A first optical unit arranged outside the stage splits a first laser beam that measures a position of the stage in a first direction into first reference and

measurement beams. A second optical unit splits a second laser beam that measures a position of the stage in a second direction into second reference and measurement beams. A first reflection unit arranged on the stage reflects the first measurement beam and a second reflection unit arranged outside the stage reflects the second measurement beam. A first detector arranged outside the stage detects an interference beam of the first measurement and reference beams and a second detector arranged outside the stage detects an interference beam of the second measurement and reference beams.

Newly added independent Claim 53 is directed to a projection exposure apparatus that includes as a reticle and/or a wafer stage, a stage apparatus having a stage movable along at least two axes. A first optical unit arranged outside the stage splits a first laser beam that measures a position of the stage in a first direction into first reference and measurement beams. A second optical unit splits a second laser beam that measures a position of the stage in a second direction into second reference and measurement beams. A first reflection unit arranged on the stage reflects the first measurement beam and a second reflection unit arranged outside the stage reflects the second measurement beam. A first detector arranged outside the stage detects an interference beam of the first measurement and reference beams and a second detector arranged outside the stage detects an interference beam of the second measurement and reference beams.

Newly added independent Claim 54 is directed to a semiconductor device manufacturing method that installs manufacturing apparatuses in a semiconductor manufacturing factory to perform various processes. The manufacturing apparatuses include a projection exposure apparatus that includes as a reticle stage and/or a wafer stage, a stage apparatus having a stage

movable along at least two axes, a first optical unit arranged outside the stage which splits a first laser beam for measuring a position of the stage in a first direction into first reference and measurement beams, a second optical unit which splits a second laser beam for measuring a position of the stage in a second direction, into second reference and measurement beams, a first reflection unit which is arranged on the stage and reflects the first measurement beam, a second reflection unit which is arranged outside the stage and detects an interference beam of the first measurement and reference beams, and a second detector which is arranged outside the stage and detects an interference beam of the second measurement and reference beams.

Newly added independent Claim 57 is directed to a semiconductor manufacturing factory in which manufacturing apparatuses perform various processes. The manufacturing apparatuses include a projection exposure apparatus that includes as a reticle and/or a wafer stage, a stage apparatus having a stage movable along at least two axes. A first optical unit arranged outside the stage splits a first laser beam that measures a position of the stage in a first direction into first reference and measurement beams. A second optical unit splits a second laser beam that measures a position of the stage in a second direction into second reference and measurement beams. A first reflection unit arranged on the stage reflects the first measurement beam and a second reflection unit arranged outside the stage reflects the second measurement beam. A first detector arranged outside the stage detects an interference beam of the first measurement and reference beams and a second detector arranged outside the stage detects an interference beam of the second measurement and reference beams. A local area network connects the manufacturing apparatuses and a gateway allows the local area network to access an external network outside

the factory. Information about at least one of the manufacturing apparatuses can be communicated.

Newly added independent Claim 58 is directed to a maintenance method for a projection exposure apparatus installed in a semiconductor manufacturing factory that includes as a reticle and/or a wafer stage, a stage apparatus having a stage movable along at least two axes. A first optical unit arranged outside the stage splits a first laser beam that measures a position of the stage in a first direction into first reference and measurement beams. A second optical unit splits a second laser beam that measures a position of the stage in a second direction into second reference and measurement beams. A first reflection unit arranged on the stage reflects the first measurement beam and a second reflection unit arranged outside the stage reflects the second measurement beam. A first detector arranged outside the stage detects an interference beam of the first measurement and reference beams and a second detector arranged outside the stage detects an interference beam of the second measurement and reference beams. According to the method, a vendor or user of the exposure apparatus is caused to provide a maintenance database connected to an external network of the semiconductor manufacturing factory. Access from the semiconductor manufacturing factory to the maintenance database is authorized via the external network. Maintenance information accumulated in the maintenance database is transmitted to the semiconductor manufacturing factory via the external network.

In Applicants' view, Nishida et al. discloses an X-Y movement table for large scale integration manufacturing in which the position of each table is measured without holding a laser mirror on the X table to provide a compact and light X-Y movement table.

According to the invention of independent Claims 31, 53, 54, 57 and 58, a two-axis movable stage has a first optical unit arranged outside the stage to split a first laser beam that measures a position of the stage in a first direction into first reference and measurement beams and a second optical unit to split a second laser beam that measures a position of the stage in a second direction into second reference and measurement beams. A first reflection unit arranged on the stage reflects the first measurement beam and a second reflection unit arranged outside the stage reflects the second measurement beam. A first detector arranged outside the stage detects an interference beam of the first measurement and reference beams and a second detector arranged outside the stage detects an interference beam of the second measurement and reference beams.

Nishida et al. may show one stage apparatus arrangement in which detectors and an interferometers for X and Y axes are arranged on an X-Y table with reflecting mirrors for both directions arranged outside the X-Y table and another arrangement in which detectors and interferometers for X and Y axes are arranged outside the X-Y table with reflecting mirrors for both directions arranged on the X-Y table. Nishida et al. teaches that both reflecting mirrors must be located on the X-Y table or that both reflecting mirrors must be located outside the X-Y table. It is a feature of Claims 31, 53, 54, 57 and 58 that a first reflecting unit is arranged on the stage to reflect the first measurement beam and a second reflection unit is arranged outside the stage to reflect the second measurement beam while a first detector is arranged outside the stage to detect an interference beam of the first measurement and reference beams and a second detector is arranged outside the stage to detect an interference beam of the second measurement

and reference beams. It is not seen that Nishida et al.'s restriction to either having both mirrors on the X-Y table with both detectors outside the X-Y table or both mirrors outside the X-Y table with both detectors on the X-Y table could possibly teach or suggest the feature of Claims 31, 53, 54, 57 and 58 of a first reflecting unit on the stage and a second reflecting unit outside the stage with both detectors outside the stage. Accordingly, it is believed that Claims 31, 53, 54, 57 and 58 are completely distinguished from Nishida et al. and are allowable.

Newly added independent Claim 52 is directed to a stage position measurement method in which first and second laser beams are irradiated to measure the position of the stage with a first optical unit arranged outside a movable stage and a second optical unit arranged on the stage. The first and second laser beams are split into first and second reference beams and first and second measurement beams by the first and second optical units. The first and second measurement beams are irradiated with a first reflection unit arranged on the stage and a second reflection unit arranged outside the stage. The first and second measurement beams irradiated with the first and second reflection units are reflected and the reflected first and second measurement beams and the first and second reference beams are made to interfere to generate first and second interference beams. The first and second interference beams are detected and the position of the stage is measured on the basis of a signal concerning the detected first and second interference beams.

It is one feature of Claim 52 that a first optical unit arranged outside a movable stage and a second optical unit arranged on the stage split first and second laser beams into first and second reference beams and first and second measurement beams and another feature that the first and

second measurement beams are irradiated with a first reflection unit arranged on the stage and a second reflection unit arranged outside the stage. As discussed with respect to Claims 31, 53, 54, 57 and 58, Nishida et al. requires both mirrors be on an X-Y table with both detectors outside the X-Y table or both mirrors be outside the X-Y table with both detectors on the X-Y table. As a result, it is not seen that Nishida et al.'s arrangement could possibly suggest the combination of features of Claim 52. It is therefore believed that newly added Claim 52 is completely distinguished from Nishida et al. and is allowable.

Newly added independent Claim 59 is directed to a stage apparatus in which a stage is movable along at least two axes and an interferometer that measures the position of the stage. The interferometer has a reflection unit arranged on the stage that measures the stage in a first direction and a second reflection unit arranged outside the stage that measures the stage in a second direction.

According to the invention of Claim 59, an interferometer that measures the position of a two axis movable stage has a reflection unit on the stage to measure the stage in a first direction and a reflection unit arranged outside the stage to measure the stage in a second direction. In contrast, Nishida et al. is restricted to one arrangement wherein the reflecting mirrors to measure the stage in both first and second directions are on the stage or another arrangement wherein the reflecting mirrors to measure the stage in both first and second directions are outside the stage. Accordingly, it is not seen that Nishida et al.'s reflecting mirror arrangement could possibly teach or suggest the features of Claim 59. It is therefore believed that newly added Claim 59 is completely distinguished from Nishida et al. and is allowable.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 31, 52-54 and 57-59, also is patentably defined over the cited art, whether that art is taken individually or in combination.


Dependent claims 32-51, 55 and 56 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicants submit that this Amendment After Final Rejection clearly places this application in condition for allowance. This Amendment was not earlier presented because Applicants believed that the prior Amendment placed the application in condition for allowance. Accordingly, entry of the instant Amendment, as an earnest attempt to advance prosecution and reduce the number of issues, is requested under 37 CFR 1.116.

Applicants also request favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action and an early Notice of Allowance of this application.

Applicants' attorney, Steven E. Warner, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



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